birds altogether, for the footprints in the Triassic sandstone of the Connecticut valley are now generally referred to Dinosaurian reptiles. Despite their strongly reptilian characters—among others, the presence of teeth in the beaks—which point to a position low down in the avian branch of the Sauropsida, Prof. Marsh argues, from the structural differences existing between such forms as *Hesperornis* and *Ichthyornis*, and between these and *Archæopteryx*, which appear greater than those presented by any two living birds, that they represent comparatively highly specialised types, and that we must look for the earliest appearance of birds in strata possibly as old as the Permian (Palæozoic). The magnificent engravings which accompany the work render it a *livre de luxe*, and place it in the category of recent American scientific works next to Leidy's 'Rhizopods,' to which we lately had occasion to call attention. We are informed that another important work on the extinct vertebrata of the West is shortly to appear, from the pen of Prof. Cope."

MR. THOMAS BOLTON of Birmingham has sent us No. 3 of his "Portfolio of Drawings and Descriptions of Living Organisms (Animal and Vegetable) Illustrative of Freshwater and Marine Life," which have been sent out by him with the living specimens.

AN interesting paper by Mr. G. M. Dawson on the distribution of some of the more important trees of British Columbia is reprinted from the *Canadian Naturalist*. In connection with this subject we learn from the *Gardener's Chronicle* that three of the most distinguished botanists of America—Dr. C. C. Parry, Dr. George Engelmann, and Prof. C. S. Sargent—are now on their way to Vancouver's Island; thence they propose to return and ascend the Columbia River as far as it is necessary to settle vexed tree questions in the extensive forest region along its shores; they will thence journey southward *viâ* Portland through the centre of Oregon to the great Fir forests of Shasta. We may hope that much "clearing-up" in the nomenclature of certain Conifers will accrue from the visit.

WE have received the five Annual Reports of the Little Miami Natural History Society, which was founded in 1875 at Antioch College, Yellow Springs, Ohio. The objects of this Society are:—(1) To develop among the students a habit of accurate observation and patient investigation rather than mere acquisition in studying the natural sciences, and thus to accustom them to the methods and rules of scientific study; and (2) to work out the natural history of the district in which the college is situated, especially the valley of the Little Miami and its tributary streams. The membership of the Society is open to all students of the College who wish to join for the purpose of doing actual work in furtherance of this purpose. Each of the Reports covers only one side of a sheet of paper, but from the catalogue of papers and reports contributed to the Society, it is evidently doing good work in the natural history of its district.

DR. R. F. HUTCHINSON of Mussoorie, N.W.P., India, writes with reference to NATURE, vol. xxii. p. 119, that he has frequently seen Mercury with the naked eye out there, especially in the cold weather when the atmosphere is clear and dry. He has also twice seen two of Jupiter's satellites under the same circumstances.

SEVERAL important changes have been made in the method of conducting the technological examinations in connection with the City and Guilds of London Institute; those interested should apply for a programme of the changes to the Secretary, Gresham College, E.C.

TELEPHONE experiments with a new apparatus by Dr. Herz have been made with the French Atlantic cable between Brest and Penzance, and are said to have yielded satisfactory results.

ON Sunday, August 8, a young man named Brest ascended at Marseilles in a balloon he had constructed himself. He was lost to view in the direction of the sea, and his aërial craft was found by fishermen close to Bastia, in Corsica. It is feared that the unfortunate aëronaut was drowned.

THE lady who took so high a place in the London University B.Sc. examination, referred to last week, was not Miss, but Mrs. Bryant, the well-known teacher at the North London Collegiate School for Girls.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus erythræus*) from India, presented by Mr. J. E. Kincaid; a Black-handed Spider Monkey (*Ateles geoffroyi*) from South America, presented by Capt. Woolward; a Common Squirrel (*Sciurus vulgaris*), British, presented by Capt. Tholandir; a Spotted Ichneumon (*Herpestes auropunctatus*) from India, presented by the Hon. L. S. Jackson; four Richardson's Skuas (*Lestris crepidatus*), Shetland Isles, presented by Mr. Robt. T. C. Scott; three Abyssinian Guinea Fowls (*Numida ptilorhyncha*) from Abyssinia, presented by Mr. Gerald Waller; two Common Nightjars (*Caprimulgus europæus*), British, presented by Mr. E. Ockenden; a Common Chameleon (*Chamæleon vulgaris*) from North Africa, presented by Mr. Percy Howard; an Areolated Tortoise (*Homopus areolatus*), a Geometric Tortoise (*Testudo geometrica*) from South Africa, presented by the Rev. G. H. R. Fisk, C.M.Z.S.; three Richardson's Skuas (*Lestris crepidatus*), Shetland Isles, four Glass Snakes (*Pseudopus pallasi*) from Dalmatia, deposited; a Yellow-collared Parrakeet (*Platycercus semitorquatus*) from West Australia, received in exchange.

OUR ASTRONOMICAL COLUMN

THE AUGUST METEORS.—The meteors annually encountered by the earth on arriving at the descending node of the third comet of 1862, in the orbit of which they are found to travel, are reported to have been less numerous this month than in most recent years. The earth arrived in the longitude of the node about midnight on the 9th inst., and in this position is only 430,000 miles, or less than twice the moon's distance from the comet's track. Even if less frequent than in several past years, a considerable number was observed on August 9, 10, and 11, and on the latter night a conspicuous Aurora Borealis, which phenomenon has so often accompanied meteoric displays, was witnessed in the north of England. Early on the evening of August 12 the meteors were sufficiently frequent and bright to attract the attention of persons in the suburbs of London who were not looking for them, but there were very few later in the evening.

It has been frequently remarked that the August meteors, or, to call them by their astronomical designation, the *Perseids*, must be much more widely distributed along the cometary orbit than are those of the November period—the *Leonids*—moving in the track of the first comet of 1866. The comet which appears to generate the August meteors, or at any rate to be followed by them, has now receded beyond the orbit of Neptune, and will continue to recede until about the year 1923. It was last in aphelion, according to Prof. Oppölzer's investigation, about 1801 or 1802, and, notwithstanding the great distance of the comet, there was a remarkable meteoric display. Herrick reports a letter from Dr. Joseph Priestley describing the phenomenon as he witnessed it on August 8, 1801, amongst the meteors being "a prodigious number of fire-balls." He compared the whole to a brilliant display of fire-works.

It is rather singular that in the history of comets we should not have been able to recognise any previous appearance of the body connected with the *Perseids*, notwithstanding its close approach to the earth's orbit when the perihelion passage takes place in the summer. Perhaps for many past centuries the perihelion may have fallen in the winter, when the comet would have greater chance of escaping notice.

CAPE OBSERVATIONS OF COMET 1880 (I).—Mr. Gill sends us the fully reduced observations of the great comet of the present year made at the Royal Observatory, Cape of Good

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Hope. A ring-micrometer was used, the aperture of the telescope and the unsatisfactory illuminating arrangements not permitting the use of the parallel-wire micrometer. The stars of comparison have been observed in the early morning with the meridian circle; also the 7½ mag. star used by Mr. Ellery on February 14. Mr. Gill expresses himself as by no means proud of his observations, the comet's nucleus being an object which could not be satisfactorily observed, but he did his best with the available means. He also writes disparagingly of the ring-micrometer, a tool which we incline to agree with him has been very much overlauded. As Mr. Gill will no doubt communicate the details of his observations and reductions to the Royal Astronomical Society or the *Astronomische Nachrichten*, we shall confine ourselves to appending his final results :—

	Cape M.T.	App. R.A.	App. N.P.D.
	h. m. s.	h. m. s.	° ′ ″
Feb. 10	8 50 2	0 3 58·59	
—	8 52 49	—	123 43 15·53
11	8 33 4	0 20 22·16	—
—	8 45 42	0 20 31·53	123 31 30·78
12	8 42 18	0 36 28·06	123 11 33·93
—	8 42 18	0 36 28·29	— 23·44
13	8 30 57	0 51 39·32	122 44 20·93
14	8 23 5	1 6 7·89	122 11 17·23
—	8 42 51	1 6 19·25	122 10 52·86
—	8 42 51	1 6 19·79	— 57·19
15	8 24 31	1 19 54·92	121 32 52·17

On February 12 two, and on February 14 three, comparison stars were employed. The observations are not yet corrected for parallax.

PHYSICAL NOTES

PROF. O. N. ROOD claims to have produced a *new* improvement into the Sprengel pump, by which he says he can easily exhaust to $\frac{1}{900000000}$ or $\frac{1}{1000000000}$. The alleged improvement is in two parts; the first being an arrangement whereby "the mercury, instead of being at once introduced into the pump, passes beforehand through an exhausted bulb"; the second being a "theoretically perfect fluid valve," formed by bending the fall-tube into a crenellated form at one point. It is hardly necessary to point out that neither of these improvements is new. The first has been adopted in the Sprengel pumps sold by instrument makers in London for the last ten years, and the second, in a form superior even to that of Prof. Rood (since the fall-tube was furnished with more than one fluid valve of a form identical with that devised by Prof. Rood), was to be seen in one of the improved Sprengel pumps exhibited in the Loan Collection at South Kensington in 1876.

M. TROUVÉ has suggested a new improvement in the old and simple longitudinal armature employed by Siemens in his earlier magneto-electric machines, and lately revived by M. Marcel Deprez in his little motors. M. Trouvé's improvement consists in constructing the armature, not with parallel sides, but with sides forming part of a skew-cylinder. Thus one part of the armature is ready to leave the poles of the field magnets when the other is approaching it, and the currents produced are therefore much more nearly continuous than with the parallel form. This will probably be a considerable advantage in the case where the armature is employed in a small motor, which will be driven much more steadily than has hitherto been possible. With three cells of Reynier's new battery this little motor will drive a sewing-machine.

M. J. PLATEAU proposes a method of estimating approximately the apparent distance at which the moon seems to different people to be in the sky. This means consists in looking at the moon steadily until the retina is sufficiently fatigued to produce an "accidental" image or ghost. The observer must then turn his gaze to a blank wall, on which he will see the accidental image projected as a tinted patch of the same shape as the moon. He is then to retreat from, or advance to, the wall until this image appears to him to be of the same size as the moon itself did. The distance measured off between the observer and the wall will be the same as that at which he unconsciously takes the moon to be. One of the sons of the author having made this experiment, found the distance to be in his case about fifty metres. This seems a small distance, but it was the result of a single experiment under circumstances which were not very favourable. M. Plateau concludes the brief memoir on the subject, presented by him to the Belgian Académie, by cautioning all persons who may be interested in the subject to take care in repeating the experiment lest the great brilliance of the luminary should damage their sight.

M. REYNIER recommends as a powerful and constant battery for electric light work a modified Daniells' cell, in which the zinc is immersed in a solution of caustic soda placed in a rectangular porous cell of parchment paper. The electromotive force of this combination varies from 1·47 to 1·35 volts, and the resistance may be less a Thomson's tray battery. The actual energy which a cell of this battery would furnish is calculated to be twice that of the ordinary round Bunsen cell.

A FEW months ago Prof. Boltzmann of Vienna published a calculation of the velocity of the electric current in a conductor based upon the discovery of Mr. E. H. Hall that a magnet acts upon a current in a conductor, tending to alter its path in the substance of the conductor. In the July number of the *American Journal of Science* Mr. Hall combats Boltzmann's calculation, and shows that by parallel reasoning a current should tend to urge forward with considerable force the conductor through which it flows; which mechanical effect is certainly non-existent. Mr. Hall now gives us the very interesting additional piece of information that the displacing force exercised by the magnet upon the current in the conductor is in an opposite direction in gold to what it is in iron—which is also quite irreconcilable with Boltzmann's theory.

AN improved centrifugal machine for schools is described in the *Nachrichten* of the Göttingen Society of Sciences (No. 9), by Herr W. Holtz. The driving-wheel runs in a vertical plane, and the quick axis may (with one and the same length of cord) be set either in a horizontal or a vertical plane, and higher or lower, also at varied distance from the frame of the machine; further, it can be so rotated that an object to be rotated with it can be suspended from it. On the same axis and of equal size with the large driving-wheel, but independent of it, runs another grooved wheel. The endless cord passes under these and round two smaller wheels higher up, one of which is on the axis to be quickly rotated (which is set in a movable support). The machine has been patented in Germany.

IN a communication to the Göttingen Society of Sciences (*Nachr.*, No. 13), Herr Wöhler states that with aluminium *alone* and with very few elements, a galvanic battery may be formed of strength sufficient to deflect a magnetic needle strongly, decompose water, and raise a thin platinum wire to glow. In a cylindrical glass vessel holding very dilute muriatic acid or dilute soda lye, is placed a roll of sheet aluminium, and within this a porous cell containing concentrated nitric acid and a smaller roll of aluminium. A projecting piece of the metal from each roll is inserted in a circular cover of ebonite.

DURING a recent thunderstorm at Hamburg the British Consul, Mr. Pogson, observed the phenomenon of St. Elmo's fire playing above the tip of the spire of a church three-quarters of a mile away. Twenty times within one hour a pale bluish ball of light resembling in tint the flame of burning potassium was seen. It appeared to be spherical in form, and from three to six feet in diameter. It seemed to hover above the spire without touching it, and lasting about forty seconds at each time of appearance.

Apropos of the approaching meeting of the British Association at Swansea, we may note that on the occasion of the last meeting at Swansea of the Association, in 1848, a paper was read by Mr. F. Wishaw "On the Telekouphon, or Speaking Telegraph." This antedates Philip Reis's "Telephon" by several years.

ANOTHER improved bichromate battery is announced, this time by the Silvertown Company. In no essential respect does this battery differ from the form known as "Fuller's battery," save in the addition of certain "exciting powders" to the liquids, a "grey compound" being dissolved in the inner cell in which the amalgamated zinc is placed, and a "red compound" in the outer cell with the carbon-rod. The use of dilute sulphuric acid is avoided by employing the "grey compound;" the avowed aim of this change is the increase of internal conductivity. The result is certainly an increase of cost.

SPEAKING of bichromate batteries, it appears to us that the true function of the porous cell now usually employed with them is entirely misunderstood. The bichromate solution, as reduced by the zinc in the cell on standing, is a colloidal substance. The

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